



Diversity, decoys and the dilution effect: How ecological communities affect disease risk

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Abstract:

Growing interest in ecology has recently focused on the hypothesis that community diversity can mediate infection levels and disease ('dilution effect'). In turn, biodiversity loss--a widespread consequence of environmental change--can indirectly promote increases in disease, including those of medical and veterinary importance. While this work has focused primarily on correlational studies involving vector-borne microparasite diseases (e.g. Lyme disease, West Nile virus), we argue that parasites with complex life cycles (e.g. helminths, protists, myxosporeans and many fungi) offer an excellent additional model in which to experimentally address mechanistic questions underlying the dilution effect. Here, we unite recent ecological research on the dilution effect in microparasites with decades of parasitological research on the decoy effect in macroparasites to explore key questions surrounding the relationship between community structure and disease. We find consistent evidence that community diversity significantly alters parasite transmission and pathology under laboratory as well as natural conditions. Empirical examples and simple transmission models highlight the diversity of mechanisms through which such changes occur, typically involving predators, parasite decoys, low competency hosts or other parasites. However, the degree of transmission reduction varies among diluting species, parasite stage, and across spatial scales, challenging efforts to make quantitative, taxon-specific predictions about disease. Taken together, this synthesis highlights the broad link between community structure and disease while underscoring the importance of mitigating ongoing changes in biological communities owing to species introductions and extirpations.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Climate Change and Human Health Literature Portal

Global or Unspecified

Health Impact: ☐

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: General Vectorborne

Resource Type: ☐

format or standard characteristic of resource

Review

Timescale: ☐

time period studied

Time Scale Unspecified